MySQL RDBMS

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1. INTRODUCTION

The report covers the analysis of the creation database for the college system. The project uses MySQL Relational Database Management System(RDBMS). It allows admins to decide course availability via the CourseAvailability table. Students can see the offered options and choose according to their wishes. A crucial aspect of the college system database is the ability of teachers to pass or fail the students by the TeacherDecisions table. On the other hand, admins can assign courses to teachers with the help of the CourseAssignments table. The design is compatible with NF1 and NF2 to ensure the limitation of data redundancy and easily modify data values in different tables(Ravikiran ,2023).

2. FUNCTIONAL AND NONFUNCTIONAL REQUIREMENTS

Functional Requirements:

Admins:

- Admins can assign courses to teachers.
- Admins decide course availability for each semester.

Students:

- Students can see the offered courses.
- Students can see the marks of the corresponding studies.
- Students can choose subjects by availability.

Teachers:

- Teachers can pass or fail the students

Non-Functional Requirements:

Interface:

- Students and Teachers have their profiles where they can access their data.
- Admins have more autonomy where the correct Email and password give access to their responsibilities.

Scalability:

- The system should successfully manage high data volume as the college progresses.

Security:

- Security should be manageable with email authentication and authorization.

Performance:

- The Database should be quick and optimised to access desired data in a minimal time.

Reliability:

- The data should be reliable with scheduled updates and backups, minimal downtime, and data integrity.

Compatibility:

- Admins, teachers, or students should be able to access their profiles on any device and make desired changes.

2.1. Tables Overview:

Admins, Students, Teachers:

The entity has its ID, name, surname, email, and password. The columns ensure the identification of corresponding roles, even if they have a mutual name. Email and ID are unique. The Default value of ID is "0", and columns have queries such as "Enter Admin Name" if left unfilled. Columns have NOT NULL property for reducing unfilling important information.

Column	Datatype	PK	NN	UQ	B...	UN	ZF	AI	G	Default / Expression
AdminID	INT	☑	☑	☑	☐	☐	☐	☐	☐	'0'
Admin_Name	VARCHAR(255	☐	☑	☐	☐	☐	☐	☐	☐	'Enter Admin Name'
Admin_Email	VARCHAR(255	☐	☑	☑	☐	☐	☐	☐	☐	'Enter Admin Email'
Admin_Passw...	VARCHAR(255	☐	☑	☐	☐	☐	☐	☐	☐	'Enter Admin Password'
Admin_Surna...	VARCHAR(255	☐	☑	☐	☐	☐	☐	☐	☐	'Enter Admin Surname'
<click to edit>		☐	☐	☐	☐	☐	☐	☐	☐	

Table 1 – Admins Table

Column	Datatype	PK	NN	UQ	B...	UN	ZF	AI	G	Default / Expression
StudentID	INT	☑	☑	☑	☐	☐	☐	☐	☐	'0'
StudentName	VARCHAR(255	☐	☑	☐	☐	☐	☐	☐	☐	'Enter Student Name'
StudentEmail	VARCHAR(255	☐	☑	☑	☐	☐	☐	☐	☐	'Enter Student Email'
StudentPass...	VARCHAR(255	☐	☑	☐	☐	☐	☐	☐	☐	'Enter Student Password'
StudentSurna...	VARCHAR(100	☐	☑	☐	☐	☐	☐	☐	☐	'Enter Student Surname'

Table 2 – Students Table

Column	Datatype	PK	NN	UQ	B...	UN	ZF	AI	G	Default / Expression
TeacherID	INT	☑	☑	☑	☐	☐	☐	☐	☐	'0'
TeacherName	VARCHAR(255	☐	☑	☐	☐	☐	☐	☐	☐	'Enter Teacher Name'
TeacherEmail	VARCHAR(255	☐	☑	☑	☐	☐	☐	☐	☐	'Enter Teacher Email'
TeacherPass...	VARCHAR(255	☐	☑	☐	☐	☐	☐	☐	☐	'Enter Teacher Password'
TeacherSurn...	VARCHAR(100	☐	☑	☐	☐	☐	☐	☐	☐	'Enter Teacher Surname'

Table 3 – Teachers Table

Courses:

Each course has a unique ID and name to limit data replication. The table has Semester_id that shows not all Courses are available throughout the year. Students can view the possible classes by the "Available" Column, which is Boolean type.

Column	Datatype	PK	NN	UQ	B...	UN	ZF	AI	G	Default / Expression
CourseID	INT	☑	☑	☑	☐	☐	☐	☐	☐	'0'
CourseName	VARCHAR(255	☐	☑	☑	☐	☐	☐	☐	☐	'Enter Course Name'
Available	TINYINT	☐	☐	☐	☐	☐	☐	☐	☐	'0'
Semester_ID	INT	☐	☐	☐	☐	☐	☐	☐	☐	'0'

Table 4 – Courses Table

CourseAvailability:

The table is used for admins to determine if the course is available. It has a unique course_id. Additional columns are Courses_ID, and SemesterID to ease decisions for course availability. The alteration in class availability is reflected in the "Available" column of the Courses table.

Column	Datatype	PK	NN	UQ	B...	UN	ZF	AI	G	Default / Expression
CourseAvaila...	INT	☑	☑	☑	☐	☐	☐	☐	☐	'0'
SemesterID	INT	☐	☐	☐	☐	☐	☐	☐	☐	NULL
IsAvailable	TINYINT	☐	☐	☐	☐	☐	☐	☐	☐	NULL
Courses_ID	INT	☐	☐	☑	☐	☐	☐	☐	☐	NULL
Admin_id	INT	☐	☐	☐	☐	☐	☐	☐	☐	NULL

Table 5 – CourseAvailability Table

Semester:

Semesters have just two columns "SemesterID" and "SemesterName". Not all Classes are available throughout the year, it is a vital factor in course availability.

Column	Datatype	PK	NN	UQ	B...	UN	ZF	AI	G	Default / Expression
SemesterID	INT	☑	☑	☑	☐	☐	☐	☐	☐	'0'
SemesterName	VARCHAR(255	☐	☑	☐	☐	☐	☐	☐	☐	'Enter Semester Name'

Table 6 – Semester Table

CourseAssignments:

The table helps admins to assign courses to teachers. The assignment has its ID. The process occurs via the interaction of AdminID, TeacherID, CourseID, and CourseAvaiabilityID, which are foreign keys. If the class is unavailable, the admin will be powerless to assign.

Column	Datatype	PK	NN	UQ	B...	UN	ZF	AI	G	Default / Expression
AssignmentID	INT	☑	☑	☑	☐	☐	☐	☐	☐	'0'
AdminID	INT	☐	☑	☐	☐	☐	☐	☐	☐	'0'
TeacherID	INT	☐	☑	☐	☐	☐	☐	☐	☐	'0'
CourseID	INT	☐	☑	☐	☐	☐	☐	☐	☐	'0'
CourseAvaila...	INT	☐	☑	☐	☐	☐	☐	☐	☐	'0'

Table 7 – CourseAssignments Table

TeacherDecision:

Students get the pass or fail status at the end of courses. The table included Teacher_ID, Student_ID, and Cours_ID for anonymous end-of-class evaluation. The decision is pass, fail, or not decided.

Column	Datatype	PK	NN	UQ	B...	UN	ZF	AI	G	Default / Expression
DecisionID	INT	☑	☑	☑	☐	☐	☐	☐	☐	'0'
DecisionName	ENUM('Pass',	☐	☐	☐	☐	☐	☐	☐	☐	NULL
Teacher_ID	INT	☐	☑	☐	☐	☐	☐	☐	☐	'0'
Student_ID	INT	☐	☑	☐	☐	☐	☐	☐	☐	'0'
Cours_ID	INT	☐	☑	☐	☐	☐	☐	☐	☐	'0'

Table 8 – TeacherDecision Table

Enrolment:

The teacher should not evaluate the student who has never taken the class. Each student is assigned to a chosen course that limits human error.

Column	Datatype	PK	NN	UQ	B...	UN	ZF	AI	G	Default / Expression
EnrollmentID	INT	☑	☑	☑	☐	☐	☐	☐	☐	'0'
StudentID	INT	☐	☐	☐	☐	☐	☐	☐	☐	'0'
CourseID	INT	☐	☐	☐	☐	☐	☐	☐	☐	'0'

Table 9 – Enrolment Table

2.2. Data Entry and Backup:

The data holds 4 admins, 12 courses, 25 students, and 12 teachers. The interaction between tables is logical and does not allow improper data entry. It is advisable to do a full backup since it can restore it fully. I used MySQL WORKBENCH for backup. The data export option secures the risk of data loss. Without such actions, the project can potentially lose all the data (Joe, 2023).

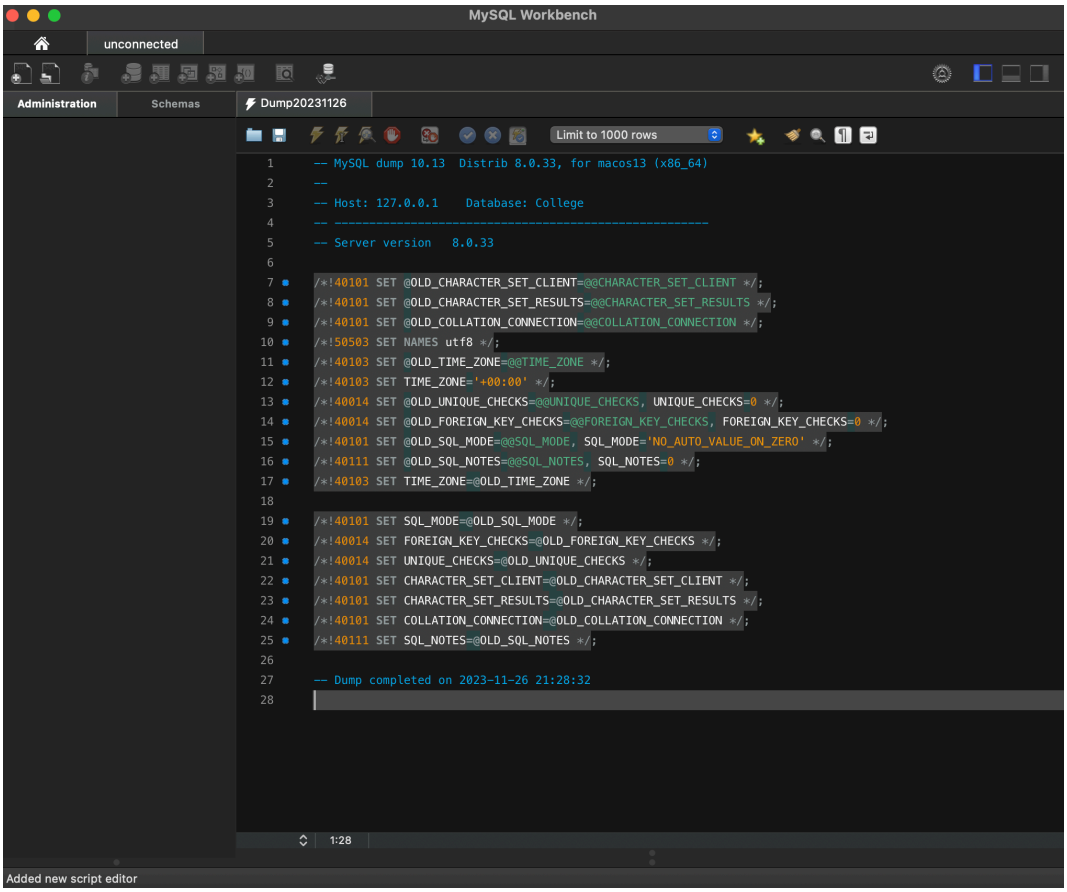

Figure 1. Data Backup

3. CONCLUSIONS

Creating a database can be a challenging part of any project. In today's world of growing data, logical interactions between tables are crucial aspects of creating a proper MySQL relational database management system. Understanding data architecture and correct planning ensures efficient and scalable database structure. A deep understanding of data dependencies with primary and foreign keys ensures its integrity in the schema. Proper database normalisation and backups reduce data complexity and help flexible data growth in the future.

REFERENCES

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